Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09343, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09343
EGU General Assembly 2008

A trajectory-based anaysis of ozone profiles from the ACTIVE campaign- Implications for the composition of the TTL

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The Tropical Tropopause Layer (TTL) is a region of paramount importance due to its role in stratosphere-troposphere exchange (STE) processes. The differing mechanisms for transport of air into the TTL, either through long-range ascent or deep convection, potentially have a profound impact upon the chemical composition therein due to their vastly differing temporal and spatial scales.

The Aerosol and Chemical Transport in tropical convection (ACTIVE) campaign was conducted from Darwin, Australia between November 2005 and February 2006, and investigated the impact of both localised deep convective and widespread monsoon convection upon the composition of the TTL. This paper examines ozone profiles from both ozone soundings and Egrett aircraft measurements, and their evolution throughout the campaign. Back-trajectory analyses are used to support such measurements. Despite the convective parameterisation connected to such an analysis, ozone concentrations within both the free troposphere and TTL are shown to be attributable to long-range sources within the wider Tropical Warm Pool region, as opposed to uplift from the local boundary layer associated with deep convection. Trajectories originate from three main areas, with the maritime West Pacific displaying extremely low ozone concentrations, the Indonesian continent showing elevated ozone signatures, and intermediate values within the proximity of the Indian Ocean.